

REMARKS

The specification has been amended to make an editorial change therein.

New claim 45 has been added. Claims 1, 3-5, 10-24, 29-43 and 45 are pending.

The indication that claims 22-24, 29, and 43 include patentable subject matter is acknowledged with thanks.

Claims 1, 3-5, 10-21, and 30-42 were rejected as unpatentable over SUZUKI et al. 6,031,957. Reconsideration and withdrawal of the rejection are respectfully requested.

Claim 1 includes a sacrifice layer that is glass doped with phosphorus and a clad layer that is glass doped with boron and phosphorus. SUZUKI et al. disclose that the sacrifice layer (8) is silicon and that the clad layer 2B, 4B is quartz (column 3, line 65; column 4, line 3; the material of over cladding 4 is not explicitly disclosed but is reasonably presumed to be quartz as the drawings show the same hatching as for the quartz substrate.) The Official Action indicates that one of skill in the art would be motivated to change the materials disclosed in SUZUKI et al. to those in claim 1 because such materials would enhance power consumption and reduce manufacturing cost.

However, it is not believed that switching from quartz to glass doped with boron/phosphorus as claimed would reduce manufacturing cost. Doping is an extra step that increases cost.

One of skill in the art would not be motivated to add a step to dope the glass because the doping would cost more, not less.

Further, the sacrifice layer 8 in SUZUKI et al. is completely removed (see Figure 2g) so the material of the sacrifice layer could not have an impact on power consumption. One of skill in the art would not choose a more expensive material (the glass doped with phosphorus claimed herein) for the sacrifice layer in SUZUKI et al. that completely disappears. There is no reason for the artisan to take what appears to be a useless action.

In addition, there is no evidence of record that glass doped with phosphorus or glass doped with boron and phosphorus would enhance power consumption relative to silicon/quartz. One of skill in the art may use material suitable for the intended use, but there is no evidence that the claimed materials are suitable or that they would change the power consumption in any way. Since there is no evidence of record that power would be enhanced by the switch suggested in the Official Action, one of skill in the art would not have found it obvious to make the substitution suggested in the Official Action.

Claims dependent from claim 1 are allowable for the same reasons.

Claim 15 is allowable because the references do not disclose that the supporting section is made of a material with thermal conductivity smaller than that of the substrate. In

SUZUKI et al., the thermal conductivity of the "support" (Figure 2, element 8) is larger than that of the substrate (Si: 168 W/m/K; SiO₂: 1.4 W/m/K). The larger number indicates that heat is more easily transferred.

Accordingly, claims 1, 3-5, 10-12, and 32 avoid the rejection under §103.

Claims 13, 16 and 30 include, among other features, a supporting section between the bridge section optical waveguide and the substrate. The Official Action points to sacrifice layer 8 as corresponding to this support section. In SUZUKI et al., the sacrifice layer 8 is completely removed (Figure 2g) so that the sacrifice layer appears only in an interim step in the manufacture of the device (e.g., Figure 2f). Sacrifice layer 8 is not found in the operative device and, indeed, its presence would cause the device in SUZUKI et al. to be inoperative for its intended purpose (column 3, lines 51-59 that explain why the gap created by the removal of the sacrifice layer is necessary).

By contrast, claims 13, 16 and 30 are not directed to an interim, inoperative device; these claims are directed to a thermo-optic phase shifter. The device in SUZUKI et al. is not a thermo-optic phase shifter when the sacrifice layer is present because the sacrifice layer prevents its operation. There is no suggestion to leave any part of the sacrifice layer 8 in the operable device in SUZUKI et al., let alone a part that supports the bridge. One of skill in the art would not find it obvious to

provide the supporting section claimed in claims 13, 16 and 30 because SUZUKI et al. indicate that the device would be inoperable if the sacrifice layer was not completely removed.

Claims dependent from claims 13, 16 and 30 are allowable for the same reasons.

Accordingly, claims 13-21, 30, 33-38, and 39-42 avoid the rejection under §103.

Claim 31 provides, among other features, that the bridge section clad layer has a width wider at ends of the heater corresponding portion than in a center of this portion (e.g., Figure 13A of the present application.) SUZUKI et al. disclose that the entire bridge has the same width (Figures 1 and 2g). There is no suggestion to change this width in any section, including the ends or center. Accordingly, one of skill in the art would not find it obvious to provide the phase shifter of claim 31.

The Official Action points to Figure 1 and states that the clad layer has a width wider at the ends than at the center. This is not seen in Figure 1. Note that the width of the corresponding clad layer is defined by the interior walls of the gap 5 (e.g., indicated by the "W" in Figure 1) and note that these interior walls are straight so that the width of the layer 4B is constant. The width of layer 4B does not vary as claimed herein. For example, note that the width of layer 4B at the middle between the heater electrodes 6b is the same as the width

outside these electrodes. The interior walls of the pairs of gaps 5 in the middle are the same distance apart as at the ends. If the rejection is repeated, it is respectfully requested that the Examiner provide a drawing indicating how Figure 1 of SUZUKI et al. is being interpreted.

Accordingly, claim 31 avoids the rejection under §103.

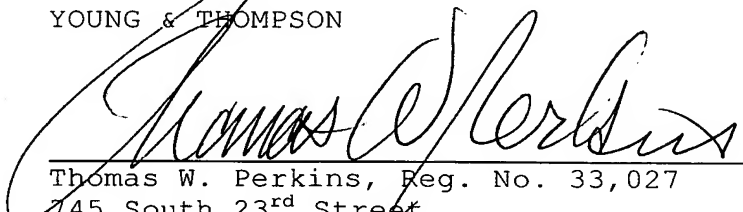
New claim 45 is supported by Figures 16A-C and is allowable because the references do not disclose the support that extends less than the full length as claimed.

In view of the present amendment and the foregoing remarks, it is believed that the present application has been placed in condition for allowance. Reconsideration and allowance are respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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